

REVIEW COMMENT SHEET




Return comments to	Carol Bicher	080	9100	8663	Comment Due Date	August 31, 1995
	Name	Bldg	Phone	fax		
Document	RF/ER 95-0098	0	Draft	OUS RF/RI Report (Woman Creek Priority Drainage)		
	Number	Rev	Draft or Final	Title		

General (G) comments require resolution but do not require resolution acceptance. Mandatory (M) comments require resolution and resolution acceptance. 1 A03-PPG-004 provides complete definitions of General and Mandatory comments. **5 Successful Closure**

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M			1 Much of the data are presented without an explanation as to WHY these data are important to the reader. Consequently much of the text does not present a cohesive picture of site contamination.	Without further detail in this comment it is not clear what data are in question. However all comments below have been addressed. The incorporation of comments on Section 4.0 in particular provides an improved discussion of the nature and extent of site contamination.	<i>[Signature]</i> 8/14/95
M			2 Without the presence of TM 15 the RI report is hard to follow (especially Section 2.0) and the results are only presented in summary format even though the text states that the results are given in detail. Suggest including more data/tables/figures from TM 15 into the RI or insert TM 15 in the Appendices to beef up the report.	TM15 is a large 3 volume report included as volumes III, IV and V of the Phase 1 RF/RI Work Plan for OUS. As previously agreed to by DOE EPA and CDPHE TM15 was intended to be a reference for the RI Report. TM15 is a controlled document and copies have been distributed to the DOE EPA CDPHE and are available in the Admin Record. It will not be included as an appendix to the RI Report but a paragraph will be added referring the reader to TM15.	<i>[Signature]</i> 8/14/95
M			3 The document is not complete since the Ecological Risk Assessment (ERA) is not included at the time of this review.	Agree. The ERA will be in the Draft Final RF/RI Report. It was previously agreed to by EG&G and DOE that the	<i>[Signature]</i> 8/14/95

No Comments		Resolutions Accepted
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	<p>The ERA is essential in providing a complete characterization of risk at the site. Additionally the OU 5 ERA is critical to the completeness of the OU 2 RI report.</p>	<p>ERA would not be in the Preliminary Draft version</p>	
<p>4</p>	<p>The amount of effort put into discussing the difference between pre and post TM 15 reporting detection limits detracts from the overall integrity of the report. The discussions as presented in the report suggest that the data are circumspect. Unless the regulatory agencies have specifically asked for the discussion presented in Section 2.3 the entire section should be moved into Section 6.0 or even into a separate appendix as appropriate. Different detection limits is a common sampling discrepancy and other OUs have dealt with this same problem without making such a big deal about it. It may be sufficient to simply state that for non detect values the higher detection limit was always chosen to ensure a conservative risk assessment value thus avoiding casting doubt on the quality of results throughout the report. Correct references to pre and post TM 15 data throughout the document as appropriate.</p>	<p>Agree that multiple detection limits are common in environmental data. However we do not feel that section 2.3 detracts from the report (although some of the discussion in this section can be better stated). The point made in this section is that the increase in concentration seen for metals detected at relatively low frequencies is actually only an apparent increase due to the value of the number substituted for each nondetect. If one half the detection limit is used as the substituted value then a higher detection limit yields a higher substituted value and ultimately a higher mean value. This higher mean may be entirely an artifact of the substituted value which is why it is difficult to reliably determine the central tendency and other statistical attributes for data sets with high (>50 /) nondetect rates.</p>	
<p>5</p>	<p>A general comment received to date by the regulators on other HHFRAs relates to incorporating all available data into the RI report. Section 6.2.2 states that data from October 1992 to November 1993 were evaluated for the HHFRA even though</p>	<p>The HHFRA proceeded without the data collected per TM15 as agreed to by the regulatory agencies. However the draft RFI/RI Report including section 6.0 has incorporated all the data collected during the</p>	

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			additional data are available The regulators have repeatedly asked that all data be included or the report will be considered incomplete For OU 5 this will require adding available data up to August 1995	implementation of TM 15	12/1/95
M			6 Delete all references to Advanced Sciences Inc (ASI) or EG&G/RMRS as authors of the document DOE is the author of the document	The referenced documents were prepared for the DOE	12/1/95
M			6 a The Assessment appears to be satisfactorily prepared and suitable for regulatory review No fatal flaws surfaced through this review and barring undetected errors or omissions the Assessment should be acceptable to Region VIII and CDPHE The methods generally follow USEPA and CDPHE guidance and seem to be consistent with the conventions used at Rocky Flats Several methodology shortcuts resulting in overly conservative estimations were taken which do not affect the findings however DOE should be mindful of their potential precedent setting nature and possibly make modifications	Thank you The risk assessment was prepared in accordance with guidance agreed upon by EG&G DOE EPA and CDPHE The risk assessment results have been presented to the agencies in several meetings and will not be a surprise to the agencies At these meetings no problems were identified with the results or the methodology which was used to derive them	12/1/95
M			7 The executive summary should not just repeat what the conclusion and recommendation section says verbatim It should be a separate summary of the entire document including such lists as the Chemicals of Concern calculated human and ecological risks etc Also no mention is made of the Ecological Risk Assessment (ERA) results The results of the ERA are important in characterizing the OU as a whole	The executive summary has in part been reworded but the major conclusions are the results of the HHRA and will remain When the text of the ERA becomes available which will be prior to submittal of the draft RI to the Regulatory Agencies the summary conclusions of the ERA will be integrated into the Executive Summary and the rest of the report	12/1/95
M			8 p ES 3 3rd par 4th sen The text is inconsistent concerning whether or not there were ten or eleven technical memoranda produced Correct as appropriate Also in this paragraph suggest mentioning the use of the observational	A total of 11 TM's were proposed to support the Field Sampling Plan for the RI however TM8 was not written but replace by a letter describing the work to be performed in the text eleven is incorrect and should be	12/1/95

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			approach in determining which stages of investigation were completed	ten The text has been corrected	8/21/95
M			9 p ES-5 1st par last sen Suggest a table listing the Chemicals of Concern (COCs) here	The Executive Summary will reference Table 6-25 in Section 6, which presents the COCs	8/21/95
M			10 p10 p ES-5 last par Provide a summary discussion of the ecological risk receptors and pathways examined Also in this paragraph suggest a table presenting a summary of the calculated risks from the HHRA and ERA inserted here	Agree The ERA will be in the Draft Final RFI/RI Report It was previously agreed to by EG&G and DOE that the ERA would not be in the Preliminary Draft version	8/21/95
M			11 p 1 12 sec 1 3 1 1st par last sen Expand the discussion of Table 1 1 Were the objectives of the original OU 5 work plan met? Give a brief rationale either in the text or the table as to WHY the original IAG scope of work was altered (i.e. original location not accessible wells could not be developed, etc.)	Agree Table 1 1 has been modified and Appendix O has been added	8/21/95
G			12 Much of this section is repetitive To streamline the presentation of Section 2 0 much of the information should be moved and consolidated in Section 4 0 Nature and Extent When the summary results are presented there is little discussion/interpretation of the significance of those results to the reader These discussions should be added to beef up the report	Agree A figure (Figure 2 18) has been added showing the logic flow of the different stages of investigation In addition section 4 0 has been re structured to present the results more clearly	8/21/95
G			13 A figure showing the logic flow chart of the different stages of investigation (Stages 1 through 5) in the RI would significantly clarify the text discussion	Agree A figure (Figure 2 18) has been added showing the logic flow of the different stages of investigation	8/21/95
G			14 A listing/presentation of the objectives of the RI as presented in OU 5 work plan and TM 15 would be appropriate in explaining why the work was conducted as presented in the	Agree A list of objectives of the Phase I RFI/RI have been listed in Section 2 0	8/21/95

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G		Section 20	<p>report Furthermore by listing the objectives of the various work plans the reader is given an idea as to whether or not the RI is adequately meeting regulatory requirements</p> <p>15 A discussion of previous and ongoing Ecological Investigations should be added to this section A brief history of how OU 5 was designated as the OU responsible for the Woman Creek watershed Ecological Risk Assessment may be appropriate here</p>	<p>Agree A brief history has been added</p>	<p>12/1/95</p>
		Section 20	<p>16 p 2 2 last par 3rd sen Clarify this idea Should this say something like "because non-detects are valued at 1/2 the detection limit the average concentration is higher" or is DOE telling the regulators that OU 5 contamination is really lower than presented? If so this entire document may be false in its representation of the nature and extent of contamination at OU 5 and the associated risk is actually lower than presented</p>	<p>Will clarify and replace text beginning at It is important to note Text will be modified to read As noted previously the value substituted for nondetects in those data sets with relatively high (>50%) nondetect rates will strongly affect the calculated value of the apparent mean Both the data analyst and the reader should keep in mind the uncertainty of statistical parameters calculated for any data set containing a high proportion of nondetect data In the case of TM15 those constituents (metals in particular) detected at relatively low to very low frequencies (<50 / to <20 / detects) tend to have mean concentrations that are artificially higher than those reported for pre TM15 data This apparent increase in mean values is the result of higher values substituted for nondetects In these cases the range of detected concentrations (reported in Tables 2 3 to 2 10) gives a better indication of the comparability of metal concentrations in TM15 and pre TM15 samples</p>	<p>12/1/95</p>
		Section 20	<p>17 p 2 11 3rd par Delete this paragraph Field instrumentation is not indicative of the potential air pathway risk Moreover the RI should not present field instrument data when laboratory analytical data is available and an HHRA has</p>	<p>This paragraph refers to the only volatile organic chemicals data collected This data would have been used for the soil vapor modeling which was determined not to be required However, this paragraph will be left in</p>	<p>12/1/95</p>

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			been performed that quantifies those laboratory data	the text because it is information collected during field investigations was with a qualifier as to the use of the data The text has been modified to explain its use	
C		Secti on 20	18 sec 2 2 1 7 1 p 2 12 This section should be moved into Section 3 0 as part of characterization of the physical parameters of the IHSS and Section 5 0 as part of the input parameters in modeling tasks	Disagree The purpose of this work was to verify the accuracy of the soil gas survey information by showing that short circuiting did not occur during the soil gas survey Also the information would not be appropriate to Sec 5 0 because the information was not used as input parameters into the air modeling tasks	1/19/95
C		Secti on 20	19 sec 2 2 1 7 2 p 2 14 Same as comment no 18	Disagree The collection of geotechnical data was conducted during the RI for the FS The data collected during the RI is intended to supplement the FS The collection of the data to evaluate the subsurface geometry that is the bedrock topography and the collection of soil samples for geotechnical analysis were performed during the implementation of TM15 Addendum to the Field Sampling plan, OUS RI/RFI	1/19/95
M		Secti on 20	20 p 2 14 Bullet list Delete those items not addressed in the RI report unless it somehow supports the discussion presented	Agree Those items not completed as part of the scope of the geotechnical investigation described in TM15 were deleted	1/19/95
C		Secti on 20	21 p 2 15 1st par last sen Provide an explanation of why the Percent Change from Pre TM 15 mean in Tables 2 3 through 2 5 is important Also see General Comment No 1 and section 2 0 tables comments	A reference has been added	1/19/95
C		Secti on 20	22 p 2 17 3rd par Reference to the pre and post TM 15 data is confusing See General Comment No 4	All discussions of data quality QA/QC and other data issues will be moved to a separate appendix (Appendix O), and will be modified for increased clarity	1/19/95

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C		Secti on 20	23 p 2 18 3rd and 4th par Suggest moving these paragraphs to Section 3 O	Agree These paragraphs were deleted from Section 2 0 and incorporated into the appropriate part of Section 3 0	8/31/95
C		Secti on 20	24 p 2 21 Wind suspension Most of this discussion should be moved into either the air modeling section or an appendix as appropriate	Agree The first paragraph will remain as an introduction to the field work that was carried out. The balance of the text has been moved to Section 5 3 3	8/31/95
C		Secti on 20	25 p 2 21 Wind resuspension 1st par 1st sen Delete the reference to future onsite resident since this exposure pathway was not assessed	Incorporated	8/31/95
C		Secti on 20	26 p 2-47 Bullet listing of results Since count per minutes (cpm) data are presented a brief discussion of how cpm correlate to pCi/g would strengthen this section Also give a background activity level in cpm The only background value stated was in pCi/g	One cure is defined as 3 7 x 1E10 disintegrations per second (the approximate activity of one gram of radium in equilibrium with its daughters) therefore one picocurie (10 ⁻¹² curie) is 0 037 dps times 60 second per minute equals 2 2 disintegrations per minute (dpm) Available background values for FIDLER and HPGe analyses will also be reported	8/31/95
C		Secti on 20	27 p 2 50 through 2 55 sec 2 3 Suggest moving this section into the HHRA or an appendix as appropriate See General Comment No 4	Section 2 3 has been move into the Uncertainty Section of the HHRA it is now Section 6 6 3 1	8/31/95
C		Secti on 20 Tabl es	28 2 3 2-4 2 7 2 8 2 9 Report the standard deviation associated with the mean value	The standard deviation associated with each mean value is already reported in these tables	8/31/95
C		Secti on	29 2 6 It is unclear what substantive point the table is trying to convey This table may be more appropriate in an	Table 2 6 has been reformatted	8/31/95

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6		20 Tabl es	appendix		
6		Secti on 20 Figur es	30 2.2 The text states that the three different analyte plumes are delineated on this figure however there is no indication of what contaminants are present at which location from the figure Correct as appropriate	The figure has been revised to indicate which contaminants are present within each plume	RL 10/19/95
6		Secti on 30	31 p 3-6 through 3-9 Hydrology Provide discussion about discharge rate in the Women Creek drainage When describing any surface water system discharge rate is a minimum measurement parameter used in its characterization (See Appendix A, p. 12)	Incorporated	RL 10/19/95
6		Secti on 30	32 p 3-8 2nd par 1st sen This sentence is confusing Unclear if the average of the groundwater AND the average of the surface water elevations were used State what time of year the average elevations were calculated because of seasonal variation a reach may change its gaining/losing characteristic Also did discharge data support the gaining/losing reach determinations	Text has been modified for clarification Note that this paragraph describes the methodology for assessment of the stream reaches It does not describe the results of the methods used for a certain time period These results are presented in subsequent paragraphs the appendices and refer to the work of Fedors and others (1992) and Fedors and Warner (1993) The measurement period is discussed in the previous paragraph	RL 10/19/95
6		Secti on 30	33 p 3-8 3rd and 4th par There appear to be a discrepancy in the text about gaining and losing reaches between reaches 18 19 and 18 20 These reaches are listed as both gaining and losing reaches year round Correct as appropriate	Corrected	RL 10/19/95
6		Secti on	34 p 3 14 sec 3 5 4 This section needs to expand the discussion of the hydrogeology Where in OU 5 are the	Section 3 0 has been re written to incorporate and clarify the discussion on hydrogeology The flow direction for	RL 10/19/95

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30			recharge areas what is the annual recharge rate what is the direction of ground water flow what do the high and low potentiometric surfaces look like etc This section does not sufficiently address the topic of OU 5 hydrogeology	groundwater is given on page 3-15 While it is believed that much of the recharge to the ground water system is from precipitation infiltration the exact amount is unknown but is estimated at 2 inches per year There have been virtually no recharge studies on site	12/14/95
30			35 p 3-15 3rd par last sen Delete this sentence it generalizes the statements made in the Hydrology section regarding gaining/losing reaches	Section 3 0 has been re written to incorporate and clarify the discussion on hydrogeology however this sentence shows the importance of the groundwater/surface water interaction and will be retained	12/14/95
30			36 p 3 34 1st par 2nd sen Expand the discussion of the hydrographs Simply listing the hydrographs is not an analysis of the data State what do the hydrographs mean to the OU 5 hydro system Do to the repetitive nature of the use of hydrographs this comment applies to the other IHSS discussions	Section 3 0 has been re written to incorporate and clarify the discussions of the hydrographs	12/14/95
30			37 p 3 38 3rd par last sen The statement that appears to have several bedrock lows that could potentially trap groundwater temporarily is not substantiated by data in this discussion Delete this statement or expand the discussion of this statement Additionally Figures 3-27 3 28 and 3 29 should not show bedrock lows if there are no data to substantiate such an interpretation	Section 3 0 has been re written to incorporate and clarify the discussion on hydrogeology Statements regarding potential bedrock traps have been deleted Figures will be modified to reflect accurate interpretations of the bedrock surface	12/14/95
30			38 p 3-39 sec 3 7 2 3 1 1st par Provide an explanation of how the dry areas are acting as far as dewatering preferential flow paths etc Such mechanisms significantly affect fate and transport and remedial decisions	Incorporated	12/14/95
30			39 No tables were presented in this section	One new table has been added titled Soil Units in OUS	12/14/95

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6		Tables	40 3 1 Call out the location of Antelope Spring	Incorporated	PL 12/1/95
6		Section 30 Figures	41 3 11 Call out the fault designations (Fault 2 3 4 etc) as stated in the text (see p 3 13)	Incorporated	PL 12/1/95
6		Section 30 Figures	42 3 21 This figure is so busy that much of the information is not decipherable	Agree This figure has been reformatted	PL 12/1/95
6		Section 30 Figures	43 3 26 Legend What is a Mini Well? Define in this legend	A miniwell is a small diameter boring (3/4 to 1 diameter) PVC 10 slot that is constructed in a 1 5 inch boring A well point is 1/4 to 1/8 diameter teflon tubing constructed in a one inch boring This has been incorporated into the text	PL 12/1/95
6		Section 30 Figures	44 3 27 3 28 and 3-29 Either change the inferred interpretation of the bedrock lows shown on these figures or provide the well control/sampling points that substantiate this interpretation (see also comment no 37)	Incorporated	PL 12/1/95
6		Section 40	45 p 4 5 3rd par 1st sen QA/QC evaluation results are more appropriate in an Appendix See Section 4 0 Tables comment no 49	All discussions of data quality QA/QC and other data issues will be moved to a separate appendix (Appendix O), and will be modified for increased clarity	PL 12/1/95

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6		Secti on 4.0	46 p 4-12 sec 4.3 bullet list Suggest presenting the COCs by media in a table	The COCs are presented in Section 6 Table 6.25 by media	10/12/95 R
6		Secti on 4.0	47 p 4-13 1st par Figures 4-1A through 4-12 do not provide a succinct look at the nature and extent of contamination and should be revised. The figures present a concentration range and do not show what the particular analyte is that exceeds the Background Mean plus so many standard deviations. The reader is left with the task of matching up two figures (sample location and number map and the extent map) and the analyte concentration tables (Tables 4-27 through 4-37) to evaluate the actual extent of contamination by analyte and concentration. Other RI reports have presented these data on one figure that calls out a box with the sample depth (if applicable) the analyte and the concentration of that analyte (see OU 1 Final and OU 2 Draft RI reports).	The figures have been revised to indicate the analytes that were detected at concentrations that exceeded the background mean plus 2 standard deviations and plus 3 standard deviations. The sample location code for each of these locations was also added. Additional figures that portray certain IHSSs for certain media and analytes in more detail were included.	10/12/95 R
6		Secti on 4.0	48 p 4-14 sec 4.3 1.1 1st par last sen When referencing sample locations provide a reference to the figure where the reader can find that location also.	References to figure numbers have been added where appropriate.	10/12/95 R
6		Secti on 4.0 Tabl es	49 4-2 through 4-5 As per EPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA analytical data and QA/QC evaluation results are more appropriate in a QA/QC appendix.	Agree The QA/QC evaluation results were moved to a new appendix Appendix O. Section 4.1.2 will provide a short summary of the data presented in Appendix O.	10/12/95 R
6		Sect 4.0 Figur	50 No comments	Response not required	10/12/95 R

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51	50	51	In general the document does not adequately present and discuss predicted results of fate and transport. The fate and transport section does not adequately focus on the results of the modeling efforts for both the ground water contaminant transport modeling and the surface water modeling efforts. It is suggested that detailed discussions regarding the specific methodologies employed by the modeling effort (such as calibration criteria, boundary conditions, steps in calibration etc.) be put in the modeling appendix and referenced. It is then suggested that results of the modeling be thoroughly presented and discussed in relation to expectations, realism, conservatism of the model, etc. Discussions of results and potential conclusions are not developed and clearly presented.	<p>FMRS disagrees. The fate and transport section adequately presents both the modeling methodology and results. Ground water modeling results (which are used to support the HHRA) are presented in Table 5-12 and are discussed on page 5-33. Surface water modeling results are presented in Tables 5-23 through 5-26 and on page 5-67. Air modeling results are presented on page 5-83. The results of the indoor air modeling are presented in Table 5-39 and discussed on page 5-88. It is important to note that all of these results were fed into the HHRA and the primary purpose of the modeling (groundwater surface water air and indoor air) is to support the HHRA.</p> <p>It is best to retain the methodologies in this section for the convenience of the reader who may be unfamiliar with modeling procedures.</p> <p>It should be noted that the purpose of the modeling is to support the HHRA. Contaminant concentrations from the ground water model would be used as input into the surface water model which is used to examine transport to receptors. The resulting concentrations at the receptors would be used in the HHRA. The ultimate result of all the modeling exercises is to provide concentration values at the various receptors.</p> <p>Unfortunately, there is no OU5 specific data (e.g., clay content, sesquioxide content, redox potential) to make specific comments regarding the geochemical processes at OU5 and their site specific effects. General statements</p>	<p>12/14/95</p> <p>12/14/95</p>
52	50	52	The fate and transport section of the RI report should highlight the potential for COCs from identified source areas to transport through media or to specific outfalls or receptors. The section should describe how specific site factors can		

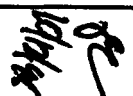


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			<p>affect transport mechanisms and the potential for future transport of COCs For example how do the specific geochemical geohydrologic and hydrologic conditions at OU 5 affect advective transport sorption dispersion complexing degradation etc of the particular COCs for each source area and for each media Section 5 1 is far too general to adequately describe potential transport mechanisms and their potential relation to OU 5 It is suggested that specific site factors be discussed and their potential relationship to COC transport be presented prior to presenting discussions regarding modeling For example how can organic carbon content clay content sesquioxide content redox potential pH etc at OU 5 potentially affect transport mechanisms for the specific COCs and source areas? How do the transient flow conditions and the low K hydraulic conditions at OU 5 potentially affect the transport mechanisms? These discussions appropriately set up discussions and results of the modeling effort The modeling discussion alone does not adequately present this information to the reader</p>	<p>are given because of the lack of site-specific data Literature and average RfFETS values were used for parameters along with the application of professional judgment</p> <p>It should be noted that the fate and transport modeling especially with regards to groundwater only simulate dissolved constituents They are not geochemical models The agency approved model MT3D only simulates retardation decay and biodegradation</p>	<p>RE</p> <p>12/19/95</p>
W		Section 5 3 1 4 3 on 5 0	<p>53 Section 5 3 1 4 3 Model Boundaries Although the hydraulic conductivity of the LHSU is low there is (usually) hydraulic contact between the Upper and Lower units suggesting that a quasi 3D model could have been made rather than making the bedrock contact a no flow boundary It is suggested that you present and discuss the differences in K between the Upper and LHSU in order to document your decision to stick with a 2 D model Generally a rule of thumb is that if 2 orders of magnitude in K separate units than a 3rd vertical dimension can usually be ignored This is important in order to document that a vertical pathway between these units is not significant</p>	<p>The approach used in the ground water modeling was documented and approved in TM13 by DOE EPA and CDPHE It has been a common approach in most RfFETS simulations to use the bedrock as the base of the modeled volume Not only is there a significant hydraulic conductivity contrast (see section 3 0 the magnitude of K varies by 2 to 3 between the UHSU and the LHSU) a vast majority of Rocky Flats operations has been in the alluvial materials Very little if any contamination has been detected in the LHSU bedrock as stated in the text The vertical connection between the UHSU and LHSU is not considered a viable pathway</p>	

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		54	Given the highly transient conditions of ground water at OU 5 and Rocky Flats in general your decision to create and calibrate your ground water model based on steady state conditions needs to be more thoroughly discussed and defended The ground water model was calibrated to only 7 alluvial wells primarily because these were the only wells with perennial water in them The adequacy of the ground water model in describing the actual conceptual model at OU 5 needs to be evaluated defended and better discussed? This is important because the actual transient and variable geohydrologic conditions at OU 5 will greatly affect transport mechanisms for COCs From the discussion presented it is questionable if the ground water model adequately represents the geohydrologic and contaminant transport mechanisms at OU 5	The approach used in the ground water modeling was approved in TM13 by DOE EPA and CDPHE A transient model is difficult to calibrate and requires a significantly greater effort than a steady state model It is a common hydrogeologic modeling practice to use average water levels from a transient system when simulating an equivalent steady state system (see Anderson and Woessner 1992 Applied Groundwater Modeling) Furthermore the level of sophistication of the surface water and air models (which is linked to the ground water model) does not warrant a quasi-3D transient groundwater model (for example the surface water model produces an averaged concentration) The purpose of the ground water model was to support the HHRA by providing concentrations for the surface water model A more sophisticated model is not necessary to accomplish this task This was not an FS modeling effort	  
		55	Section 5 3 1 5 1 COCs in Groundwater. The screening methodology employed screened out plutonium uranium beryllium americium and other COCs from the contaminant transport modeling effort leaving only manganese barium and radium which are questionable real contaminants The purpose of the contaminant transport modeling program should be to predict if possible the potential future extent of the contaminants coming from the source areas Your calibration procedure effectively screened out the most important contaminants of interest If the model is not useful in making these predictions then that must be discussed in relation to what might be expected under reasonable assumptions The information of 5 12 and 5 13 does not adequately present and discuss results of the ground water	The purpose of the model was to provide support for the concentration values at the various receptors determined for the HHRA not to predict the future extent of contaminants emanating from the source areas It was not intended as an FS model The use of the background mean plus two standard deviations is a common practice to model contaminants that are significantly above background levels The objective of the modeling was to provide concentration values for the HHRA no purpose is served in the simulation of contaminants that are not significantly greater than background levels Furthermore the COC selection process is based on total concentrations and groundwater models only simulate dissolved concentrations The only OU5 COCs in	

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		Section 50	modeling program to the reader and adds little value to a Feasibility Study	groundwater that are present as dissolved constituents in the groundwater are barium manganese and radium 226	28 10/14/95
W		Section 60	56 Section 6 1 4 AOCs AOCs as used at Rocky Flats are unique Suggest a Citation of the CDPHE/EPA protocol 57 Section 6 2 Chemicals of Concern No mention of "waste related considerations and scant professional judgment to stop and think about the plausibility of the protocol results sets a compromising precedent The COC selection process does not affect the outcome However if concentrations were higher and/or residential exposure scenarios were applied the acceptance as COCs questionable native compounds such as antimony mercury and zinc could be result in an assessment where naturally occurring compounds suggest misleading risks If Jim Whiting's data is available it should be incorporated at least through simple qualitative comparison It is hard to believe that ²²⁶ Ra is actually a groundwater contaminant (3 3 pCi/l reported in Hem 1989 Rocky Flats never processed ores where would it come from?) Also solubility limits preclude ²³⁹ Pu (pK _{so} up to 55 Lange's Handbook, 1992 no history of large scale ²³⁹ Pu disposal at OU 5) from being in solution at levels giving significant risk Table 6 9 notes that the most conservative course was taken in this step	The concept of Areas of Concern was agreed to by all parties at a meeting held in May of 1994 The Concept and methodology is documented in the Human Health Risk Assessment Methodology for RFETS (April 1995) This citation will be added to the text The COC selection process was jointly established between DOE EPA and CDPHE The COCs were discussed in meetings with all the agencies and COC Technical Memorandum for OU5 was reviewed and approved by everyone concerned It was agreed that the problem of questionable metal PCOCs in groundwater would be addressed sitewide basis in a CERCLA comprehensive risk assessment for RFETS Questionable native compounds (including antimony mercury and zinc) have been retained as COCs largely due to the insistence of the regulators Because DOE bears the burden of proof to eliminate PCOCs and because the regulators determine at what point that burden is satisfied such naturally occurring constituents may be required by the regulators to remain as COCs (e g The dispute in OU1 over antimony and manganese in groundwater) Concur that the inclusion of antimony etc is beyond reasonable Although Ra 226 was not processed at Rocky Flats it is a natural decay product of U 238 and U 234 and uranium was processed onsite Additionally there is a good correlation of radium 266 to uranium 238 and uranium	28 10/14/95 10/14/95

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				<p>233/234 for background borehole materials at Rocky Flats (thereby suggesting a natural occurrence of radium) the highest activities of radium in onsite borehole materials are found at the Solar Ponds and the 400 Area (uranium processing buildings) Distribution maps of Ra 226 in groundwater do show an increase in Ra 226 activity from the buffer zone towards plant site This distribution makes it difficult to dismiss radium at present However though OUS Ra 226 activities exceeded those detected in background groundwater samples it is comforting to note that Jefferson County (Morse and Moody 1992) found Ra 226 levels as high as 49 pCi/L in residential wells in Coal Creek Canyon Hem (1992) in his discussion of radium notes that most natural waters contain less than 10 pCi/L and that some deep aquifers are reported to contain more than 33 pCi/L however at Rocky Flats the groundwater is young shallow and unconfined and should not be compared with groundwater from deep aquifers Locally in Coal Creek Canyon (a few miles west of Rocky Flats) tested groundwater contained high activities of radium (range = 0.0 to 1200 pCi/L) Radium at Rocky Flats is an issue that should be evaluated further and this information will be used in sitewide discussions of Ra 226 in groundwater</p> <p>With regard to Jim Whiting's data it was also agreed among the agencies that the old Rock Creek data would be used for existing background comparisons and that Jim's data would be used for new background comparisons Statistically there was not enough difference between the two data sets to warrant the expense of completely redoing the background comparisons and all the subsequent calculations of risk</p>	
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M		Section 60	58 6 2 5 Essential Nutrients Was current Region VIII guidance used? We have COCs including Mg Zn Cu Mn that could be assessed and possibly eliminated using Region VIII's approach Again low concentrations and/or no residential exposure scenario makes this more of a method issue than a compelling oversight	Agree that the activity of dissolved plutonium is low due to solubility constraints however the issue of colloidal transport of plutonium bearing particles/colloids has not been thoroughly evaluated In addition the State has insisted that the site specific standard of 0.05 pCi/L applies to unfiltered groundwater (total plutonium) whereas DOE has argued that the standard applies to filtered groundwater (dissolved plutonium) Until these issues are resolved the regulators will require us to follow the most conservative course	10/14/95
M		Section 60	59 6 2 7 Concentration/Toxicity Screen The confox screen has fallen from favor lately because of it soft technical underpinnings and zero-sums configuration (something will always be a COC) Most regions and States use a benchmark comparison such as the Rocky Flats PRGs or Region III Screening Concentrations at this step It is suggested that 1) this be acknowledged (softly) and 2) a strong citation from a meeting or TM be used to mollify potential criticism here	The elimination of as essential nutrients Ca Fe Mg and K as PCOCs was discussed in the OUS COC TM which has been reviewed and approved by all involved parties/agencies Other essential nutrients such as Zn Cu and Mn could have been eliminated using the Region VIII approach but it was easier and thus more efficient to include them in the risk assessment than to run them through the calculations in the Region VIII approach Consequently, none of these COCs are risk drivers	10/14/95
M		Section 60	60 6 3 Scenario and Pathway Identification As indicated above, the omission of a residential exposure scenario is	The use of the confox screen as a process of selecting COCs was discussed in the OUS COC TM which has been reviewed and approved by all involved parties/agencies	10/14/95
				The residential exposure scenario was deleted from the OUS risk assessment based on correspondence among	10/14/95

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60			critical to the no unacceptable risk finding It is suggested that this Section be buttressed by citations of meetings TM's and other applications (e g RMA) where similar scenarios have been accepted	EG&G and DOE EPA, and CDPHE all of whom agreed that future onsite residential land use was not likely	
61	60	Secti on 60	61 6 4 Exposure Assessment Using maximum concentrations when the data set is greater than three samples is ominous from a precedent standpoint It is suggested that further evaluation and professional judgment be applied to avoid using maximums Quartile and/or percentile estimates (such as the 90th percentile) could be readily developed and inserted into the spreadsheets spreadsheets reprinted and spot text adjustments made in a matter of days Once again this won't affect the finding but will avoid the precedent of using worst-case default methods which could produce different results in a dissimilar scenario	RFETS HHRA methodology states that the 95% UCL will be used as the exposure point concentration for each COC for each AOC The only time the maximum concentration of a COC is used is when the 95% UCL exceeds the maximum The concept and methodology is documented in the Human Health Risk Assessment Methodology for RFETS (April 1995) This citation will be added to the text	PL 11/14/95
62	60	Secti on 60	62 6 4 2 Exposure Factors Do the water and sediment contact and duration rates reflect Woman Creek and SID specific weather conditions (e g days of temperature < 32 snow, rain, etc.)? Suggest this be considered	The exposure factors used in the OUS risk calculations are statewide and have been negotiated with the DOE EPA and CDPHE	PL 11/14/95
63	60	Secti on 60	63 6 4 2 5 External Exposure Is this equation exposure and duration specific/ EPA's external dose slope factor considers 24 hour/day and 365 day/year exposure This could be important since external gamma turns out to be a key exposure pathway Please check	Yes this has been built into the equation	PL 11/14/95
64	60	Secti on 60	64 6 4 3 Intakes Please note that the supporting Tables show radionuclide intakes in units of mg/kg day 1) If this is a presentation oversight please correct with footnote	A footnote indicating the correct units has been added to the tables	PL 11/14/95

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			<p>2) If risks are computed from this basis there is a systemic problem with the remainder of the report and possibly the findings</p> <p>Please follow up</p>		
65	on	60	<p>Section 6.6.2 There is an inappropriate risk summation throughout this Section. Radionuclide risks are added to chemical risks. Although it doesn't affect the outcome (RME) while chemical slope factors are misbegotten upper bound estimates. Basically applies and oranges mathematically. They should be computed and presented separately.</p> <p>Why were no traditional dose equivalent computations done and presented? DOE receives a major risk management benefit by considering the more widely accepted effective dose equivalent approach that is discussed in FLAG (Chapter 10). These computations would likely illustrate no unacceptable doses (like the findings show no unacceptable risk) however there may be other circumstances where DOE's appeal to the dose equivalent approach (and historical use and acceptance including OU 5) could be very useful.</p> <p>Similar comment: Why was not RESRAD run? It is actually a preferable exposure assessment tool that uses current dose conversion factor and incorporates decay products such as ^{222}Rn from the uranium series. DOE Order 5400.5 requires its use to evaluate free release of soils containing radionuclides.</p>	<p>The risk estimates were summed the way that was agreed upon with the agencies. A section on dose equivalent computations has been added to the HRA. RESRAD was not run because it was agreed by all parties to not be used in the Modeling TM. The radiological dose analysis as performed for the OU 2 RI/RFI has been included for OU 5. It is consistent with radiological risk characterization for CERCLA, therefore it meets the requirements and is equivalent to RESRAD. A report on the functional equivalency of RESRAD and RI/FS outputs was prepared for DOE and delivered with a cover letter to Jesse Roberson dated July 25, 1994.</p>	
66	6.6.3	Uncertainty	Risk less than 1E-4 does not preclude	In meetings held among DOE, EG&G, and the agencies	

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on 6 0			<p>the need to address uncertainties A very major bias and overestimate of risk stems from the CDPHE AOC approach It effectively segregates out and drives high concentrations through the exposure equations Given the large expanse of OU 5 it seems that about 15 % or less is affected and this serves as the basis for computation Are not current and future use receptors also exposed to the other 85% of the site that is not affected (e g no exposure to contaminants) and won't future receptors exposure be highly modified by structures pavement sodden areas etc ?</p> <p>In the uncertainty section as a minimum one should strive to illustrate the highly biased and conservative nature of this assessment If probabilistic considerations were taken into account the future risk would likely be 100 times lower than the estimates shown on Table 6 142 and H1's on Table 6 143</p>	<p>during the past year it has been consistently stated that a quantitative uncertainty analysis would be performed only for driving pathways for Areas of Concern with cumulative risk estimates over 1E-4</p>	
on 6 0			<p>67 Risk Characterization The assessment would benefit from a risk characterization discussion that emphasized the findings in perspective As a minimum computed risks could be compared to the 1E-4 to 1E-6 range and the H1's could be compared to the 1 0 benchmark both are cited in the NCP Additional comparisons often used to give the reader some perspective include</p> <p>The background cancer incidence in Colorado of about 0 25</p> <p>The added risk attributable from OU 5 exposure 3E 5 + 0 25 = 0 25003 (about a 0 01% increase)</p> <p>EDE s (had they been computed) compared to naturally occurring doses (about 3 rem per year)</p> <p>EDE s compared to Standards and Guidelines such as the</p>	<p>The estimated risks are compared to the risk range in Section 6 7 Risk Assessment Summary However the discussion in Section 6 7 has been expanded and the EDE comparisons have been added</p>	

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			NCRP's recommended 100 mrem/year		
			<i>Note Change in Reviewer initials JAS form ERT/AMPE</i>	<i>Bldg T130U X9735</i>	
S			1 The use of fence diagrams should be considered as a means of enhancing the understanding of the hydrogeologic regime as presented in Chapter 3 0	The use of two dimensional hydrogeologic cross sections as presented in the report convey the same information as a fence diagram therefore fence diagrams will not be added A fence diagram is just two or more cross sections graphically presented as a three dimensional diagram	<i>RC</i> <i>1/14/95</i>
E			2 The South Interceptor Ditch (SID) plays a major role in the surface water regime of OUS especially influencing the spread of contamination A better description of the SID is needed in the Executive Summary the SID is described as diverting all runoff from the south side of the Rocky Flats Industrial Area (p ES 3) However Figure 1 2 does not clearly show the SID it appears that the industrial area runoff may reach Woman Creek in the western extremity of the SID but the terminus of the SID is not shown The SID is identified in later chapters as playing a significant role in limiting the spread of contamination and should be fully described to the reader to make the arguments for its value more persuasive	Agree A more detailed description and location map of the SID has been included in the RI Report	<i>RC</i> <i>1/14/95</i>
S			3 The forms of metal constituents detected in soils and sediments are important to the assessment of whether releases are occurring or threatened In particular mercury present in sediments would be quite mobile and more toxic if in an organic form and its mobility could impact the type and extent of remediation required For example would sediments or soils need to be removed as opposed to closure in place or leaving the sediments unremediated if re mobilization forms	Although it would be useful to know the speculation of metals in soils sediments and waters at Rocky Flats there exist few data on speciation (other than some chromium VI data for water) Without microprobe data for solid phases and speciation data for aqueous phases most of the discussion would consist of textbook descriptions of chemical behavior as given below for mercury	<i>RC</i> <i>1/14/95</i>


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			<p>were considered The issue of metals mobility and toxicity variations with form should be addressed in the selection of COCs in Chapter 4 0 the assessment of fate and transport mechanisms in 5 0 the human health risk assessment in 6 0 and in the ecological risk assessment that is in preparation</p>	<p>The most stable form of mercury in natural waters is Hg(aq) which has an equilibrium solubility of 25 UG/L in a closed system over a wide range of Eh and pH (Hem 1992) Hem also notes that "the amount of dissolved mercury that may occur in the form of organic complexes is uncertain Methane-generating bacteria are required to produce organic complexes such as methyl mercury (HgCH₃+) in sediments The biological cycle for mercury is discussed in Salomons and Forstner (1984)</p> <p>The issue of metals mobility is addressed in modeling (Section 5 0 Fate and Transport) by the estimation of mobility" incorporated in the retardation factor</p> <p>Given the data at hand the speciation of metals in waters could be calculated using the geochemical modeling program WATEQF (Plummer et al 1976) Unfortunately redox potential (Eh) is not measured during sample collection at Rocky Flats so an approximate Eh would need to be specified for modeling The uncertainty of the results for redox sensitive species could therefore be large</p> <p>The reviewer seems to have confused cation/anion balance (i.e. charge balance or ion balance) with the solution composition (i.e. the relative proportions of dissolved constituents) Cation/anion balance cannot be used to assess items 1 2 3 4 and 7 listed by the reviewer</p> <p>The chemical composition of water is a completely different animal from the charge balance of a water,</p>	<p>4S</p>
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			groundwater (fingerprinting with major chemical relationships) 3) mixing in wells (use of sequential sampling and field measurements may help identify wells with cross aquifer screen placements) 4) anthropogenic vs naturally-occurring constituents (analyses of major constituents can identify unique chemicals make-ups such as sodium sulfate-dominated ion balances which are often indicative of contamination by waste discharges) 5) check reliability of analysis (waters that do not show a close ion balance may have poor quality chemical analyses) 6) ions missing from analysis (lack of cation anion balance may indicate the presence of an unusual constituent not analyzed) and 7) health hazards (high dissolved solids concentrations can present health problems)	although these are sometimes erroneously confused All waters/solutions are electrically neutral (i.e. actual cation/anion balance is perfect) however due to random or systematic analytical errors or incomplete analyses the reported milliequivalents of cations may not equal the reported milliequivalents of anions The calculation of charge balance provides a measure of the completeness and accuracy of the analyses For dilute waters the charge balance should not be more than about +/- 10 percent (Accuracy and completeness listed as items 5 and 6 respectively by the reviewer)	
S			5 In Chapter 5 the discussion of Chemical Fate and Transport should include consideration of the effects that volatile organic compound (VOC) density both in water and vapor form can have upon contaminant transport the contaminant transport modeling does not appear to have accounted for density differences so the density information should be used in interpretation of the modeling results	To evaluate the chemical composition of water graphical aids are helpful The evolutionary trends in the major ion chemistry of a water can be assessed by analyses plotted on a Piper diagram (Piper 1944) the chemical type of a water can be represented by a particular shape as on a Stiff plot (Stiff 1951) Hem (1992) covers many of the graphical methods used to depict water chemistry It would be possible to prepare Stiff and Piper diagrams for chemical analyses of samples collected for OU5 waters if these diagrams are deemed necessary	

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S			<p>6. Human Health Risk Assessment. Section 6.7. Risk Assessment Summary. Throughout the summary maximum total estimated risk values listed for the Areas of Contamination should be identified as to whether they refer to RME carcinogenic or non-carcinogenic risks</p>	<p>Risks are listed for Areas of Concern not Areas of Contamination Estimates of risk only apply to carcinogens noncarcinogens have adverse effects on human health and are reported as hazard indices or hazard quotients</p>	<p>10/1/95</p>
S			<p>7. Chapter 8. Preliminary Evaluation of Remedial Alternatives. This chapter has no substantive content EPA guidance (OSWER Directive 9355 3-01 October 1988) indicates that remedial action objectives should be revisited after data collection and analysis and that a range of alternatives should be identified which address the viable objectives Part of the data gaps evaluation then should involve identification of those data gaps which may prevent the later thorough analysis of the alternatives in the detailed FS In the case of OUS where our Human Health Risk Assessment has indicated that no remedial action may be necessary (pending the outcome of the Ecological Risk Assessment) this evaluation of remedial objectives and alternatives is particularly important in laying the groundwork for a No Action determination</p>	<p>The OUS Work Plan dated February 1992 Section 5.7 Task 7 requires the Development and Screening of Remedial Alternatives However this work is part of the CMS/FS specifically TM#1 and TM#2 which typically runs parallel to the end of the RFI/RI Section 5.9 of the Work Plan Task 9 Remedial Investigation Report describes the content of the RFI/RI Report and does not include the Development and Screening of Remedial Alternatives Chapter 8 has been added to describe this work if a remedial action (e.g. stabilizing the landfill slope and preventing future erosion institutional controls monitoring land use restriction) is required Note that the results of the Baseline Risk Assessment only conclude that action is not warranted based on risk This does not excluded ARARs</p>	<p>10/1/95</p>
S			<p>8. Chapter 9. Preliminary Identification of Data Gaps. If any viable remedial action objectives types of remedial actions and technologies are identified then the data gaps discussion should address them and identify any data that ought to be collected in Phase II RFI/RI to allow full evaluation and development of the CMS/FS This would also apply to the No Action alternative in the event that it will be selected from the standpoint that additional data may be needed in some IHSSs to demonstrate that contamination levels are insufficient to warrant remediation</p>	<p>Evaluation and discussion of any data gaps will be included if any viable remedial actions are identified</p>	<p>10/1/95</p>

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E			9 Per the CERCLA RI/FS Guidance (OSWER Directive 9355 3-01 October 1988) chemical specific and location specific ARA's must be presented. Particularly in the case of groundwater in view of its omission from the baseline risk assessment ARA's should be discussed to indicate whether an ARA's waiver will be needed.	The most recent OSWER Directive is 9355 0 30 April 22 1991. The chemical specific and location specific ARA's were planned and agreed to by DOE/EPA/CDPHE to be presented in the CMS/FS TM#1. The CMS/FS for OUS was placed on hold in June 1995 due to a lack of funding. This work has not been funded in FY96.	8/1/96 10/1/96
E			10 Section 10.2 Recommendations. Referring back to Comment No. 2 if the SID plays a major role in limiting the spread of contamination associated with OUS then its tendency to create a sink for contaminants that are mobilized the surface water runoff upgradient must be considered. The possibility that it constitutes or may in the future constitute a secondary contamination source in the groundwater down gradient of the SID must be addressed to support the determination that remediation is not necessary in OUS.	The SID and its interaction with both the groundwater and surface water systems were accounted for in the models for both systems (see Chapter 5 0). These models provided the exposure-point concentrations used for the risk assessment. As discussed in Chapter 6 0 the risks calculated for OUS using both concentrations measured during this investigation and estimated by the models were negligible. Therefore the SID and its potential contribution to site risk have been addressed throughout the OUS RI/RI.	8/1/96 10/1/96
			Note Change in Reviewer Cheryl L Row X3138		
	ES 1	Parag raph 3	1) Pond C 2 is not on Woman Creek. It is isolated and is fed by the South Interceptor Ditch (not Woman Creek).	Pond C 2 is isolated and is fed by the South Interceptor Ditch (not Woman Creek) but this description is for the geographical location of ponds C 1 and C 2 which are situated in the historical river channel of Woman Creek. A discussion of the isolation of the C 2 pond can be found in Section 1 2 2 1 3 of this text.	8/1/96 10/1/96
	ES 2	Parag raph 4	2) Last sentence should be reworked. The pond is currently operated in a flow through mode with the outlet gates being left in the open position.	Agree this entire paragraph has been removed from the executive summary. A write up of the pond outlet working for pond C 2 is included in Section 3 of this text. The following sentence has been added to the text in Section 3 7 3 1 Site Description as the third sentence. Pond C 1	8/1/96 10/1/96

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C	ES 6	Parag raph 1	3) The par states that the groundwater was not evaluated as an exposure pathway but the surface water and seeps were But if the ground water feeds the seeps should it not be included ?	As agreed to by the regulatory agencies ground water was not evaluated on a site wide basis because there is not sufficient quantities for residential water consumption in the HHRA the modeling considered the transport of COCs to surface waters from the groundwater.	8- 10/2/95
M	ES 7	Parag raph 1	4) Does the risk value for AOCC3 account for the ultimate goal of the site of breaching C 1 and eventually C 2 or is this risk based on the sediments remaining covered with water?	The risk value for AOCC3 is based on current conditions that is the dams stay in place however a risk assessment has been performed on an air pathway exposure scenario for dry sediments which concluded that the risk would remain below EPA's point of departure of 1E-06 for receptors and the cumulative HIs would remain less than 1	8- 10/2/95
G	Pg 12	Parag raph 3	5) Same comment as #1 above	Pond C 2 is isolated and is fed by the South Interceptor Ditch (not Woman Creek) but this description is for the geographical location of ponds C 1 and C 2 which are situated in the historical river channel of Woman Creek A discussion of the isolation of the C 2 pond can be found in Section 3 of this text.	8- 10/2/95
G			6) The paragraph mentions 11 TM's and then ten TM's Is this a mistake or a typo? The document also mentions 10 TM's elsewhere in the text	A total of 11 TM's were proposed to support the Field Sampling Plan for the RI however TM8 was not written but replace by a letter describing the work to be performed In the text eleven is incorrect and should be ten The text has been corrected	8- 10/2/95

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